

Chemokines: Receptors and Ligands

CC Family of Chemokines and Chemokine Receptors.			
Receptor	Chemokine Ligands	Receptor Cell Types	Disease Connection/Function
CCR1	CCL3 (MIP-1 α), CCL5 (RANTES), CCL7 (MCP-3), CCL14 (HCC1)	T cells, monocytes, eosinophils, basophils	Rheumatoid arthritis, multiple sclerosis
CCR2	CCL2 (MCP-1), CCL8 (MCP-2), CCL7 (MCP-3), CCL13 (MCP-4), CCL16 (HCC4)	Monocytes, dendritic cells (immature), memory T cells	Atherosclerosis, rheumatoid arthritis, multiple sclerosis, resistance to intracellular pathogens, type 2 diabetes mellitus
CCR3	CCL11 (eotaxin), CCL13 (eotaxin-2), CCL7 (MCP-3), CCL5 (RANTES), CCL8 (MCP-2), CCL13 (MCP-4)	Eosinophils, basophils, mast cells, Th2, platelets	Allergic asthma and rhinitis
CCR4	CCL17 (TARC), CCL22 (MDC)	T cells (Th2), dendritic cells (mature), basophils, macrophages, platelets	Parasitic infection, graft rejection, T-cell homing to skin
CCR5	CCL3 (MIP-1 α), CCL4 (MIP-1 β), CCL5 (RANTES), CCL11 (eotaxin), CCL14 (HCC1), CCL16 (HCC4)	T cells, monocytes	HIV-1 coreceptor (T-tropic strains), transplant rejection
CCR6	CCL20 (MIP-3 β , LARC)	T cells (T regulatory and memory), B cells, dendritic cells	Mucosal humoral immunity, allergic asthma, intestinal T-cell homing
CCR7	CCL19 (ELC), CCL21 (SLC)	T cells, dendritic cells (mature)	Transport of T cells and dendritic cells to lymph node, antigen presentation, and cellular immunity
CCR8	CCL1 (1309)	T cells (Th2), monocytes, dendritic cells	Dendritic-cell migration to lymph node, type 2 cellular immunity, granuloma formation
CCR9	CCL25 (TECK)	T cells, IgA+ plasma cells	Homing of T cells and IgA+ plasma cells to the intestine, inflammatory bowel disease
CCR10	CCL27 (CTACK), CCL28 (MEC)	T cells	T-cell homing to intestine and skin

CXC, CX ₃ , C, and XC Families of Chemokines and Chemokine Receptors			
CXCR1	CXCL8 (interleukin-8), CXCL6 (GCP2)	Neutrophils, monocytes	Inflammatory lung disease, COPD
CXCR2	CXCL8, CXCL1 (GRO α), CXCL2 (GRO β), CXCL3 (GRO γ), CXCL5 (ENA-78), CXCL6	Neutrophils, monocytes, microvascular endothelial cells	Inflammatory lung disease, COPD, angiogenic for tumor growth
CXCR3-A	CXCL9 (MIG), CXCL10 (IP-10), CXCL11 (I-TAC)	Type 1 helper cells, mast cells, mesangial cells	Inflammatory skin disease, multiple sclerosis, transplant rejection
CXCR3-B	CXCL4 (PF4), CXCL0 (MIG), CXCL10 (IP-10), CXCL11 (I-TAC)	Microvascular endothelial cells, neoplastic cells	Angiostatic for tumor growth
CXCR4	CXCL12 (SDF-1)	Widely expressed	HIV-1 coreceptor (T-cell-tropic), tumor metastases, hematopoiesis
CXCR5	CXCL13 (BCA-1)	B cells, follicular helper T cells	Formation of B-cell follicles
CXCR6	CXCL16 (SR-PSOX)	CD8+ T cells, natural killer cells, and memory CD4+ T cells	Inflammatory liver disease, atherosclerosis (CXCL16)
CX ₃ CR1	CXCL1 (fractalkine)	Macrophages, endothelial cells, smooth-muscle cells	Artherosclerosis
XCR1	XCL1 (lymphotactin), XCL2	T cells, natural killer cells	Rheumatoid arthritis, IgA nephropathy, tumor response

Adapted from Charo, IF and Ransohoff, RM NEJM 354:610, 2006

Notes:

CC, CXC, Cx3C, and XC refers to characteristic cysteine residues.

CC chemokines are largely directed at recruiting mononuclear cells to sites of inflammation.

CXC chemokines are largely directed at recruiting and activating myeloid cells and are important for wound healing and angiogenesis. They are encoded on chromosome 4. Inflammatory mediators induce the expression of these chemokines.

Fractalkine, the only member of the Cx3C family can act as an adhesion molecule or a soluble chemoattractant

Receptors for chemokines are seven transmembrane receptors that are G-protein coupled.